TABLE 2.—*Free-air resultant winds (m. p. s.) during May, 1922.*

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (23m.)				Drexel, Nebr. (396m.)				Due west, S. C. (217m.)				Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		Normal.		Mean.		Normal.		Mean.		Normal.		Mean.		Normal.		Mean.		Normal.		Mean.		Normal.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 4° E.	2.0	S. 19° E.	2.6	S. 52° W.	1.8	S. 2° W.	1.5	S. 62° E.	0.9	N. 58° E.	0.9	N. 75° W.	0.7	S. 55° E.	0.6	S. 12° E.	1.9	S. 18° E.	2.0	S. 5° E.	1.6	N. 58° E.	0.9
250	S. 5° E.	2.1	S. 19° E.	2.6	.....	.....	.....	.....	S. 64° E.	0.9	N. 56° E.	1.0	.....	.....	.....	.....	S. 1° W.	2.9	S. 11° E.	2.6	S. 7° E.	1.7	N. 60° E.	0.9
500	S. 11° E.	2.9	S. 15° E.	3.3	S. 63° W.	2.1	S. 4° W.	1.8	S. 77° E.	0.9	N. 41° E.	1.3	S. 81° W.	0.8	S. 40° E.	0.8	S. 3° W.	4.9	S. 4° E.	4.0	S. 2° W.	2.1	N. 61° E.	0.6
750	S. 9° E.	3.4	S. 4° E.	3.7	S. 87° W.	2.8	S. 8° W.	2.0	S. 82° E.	0.4	N. 20° E.	1.3	S. 54° W.	1.7	S. 19° E.	1.2	S. 15° W.	5.2	S. 4° W.	4.6	S. 17° W.	2.3	N. 9° E.	0.3
1,000	S. 4° W.	3.3	S. 8° W.	3.9	W.	3.0	S. 26° W.	2.6	S. 50° W.	0.1	N. 4° E.	1.5	S. 44° W.	1.8	S. 7° E.	1.0	S. 24° W.	5.1	S. 16° W.	4.6	S. 39° W.	2.7	N. 42° W.	0.5
1,250	S. 25° W.	4.0	S. 24° W.	4.2	S. 86° W.	3.8	S. 34° W.	2.9	S. 39° W.	1.4	N. 30° W.	1.0	S. 53° W.	2.4	S. 7° W.	2.5	S. 35° W.	5.1	S. 23° W.	5.7	S. 48° W.	3.6	N. 46° W.	1.3
1,500	S. 28° W.	4.4	S. 32° W.	4.5	S. 84° W.	4.0	S. 42° W.	3.6	S. 75° W.	3.3	S. 69° W.	1.5	S. 48° W.	3.0	S. 12° W.	2.5	S. 44° W.	5.3	S. 31° W.	5.4	S. 47° W.	3.7	N. 64° W.	1.7
2,000	S. 40° W.	6.0	S. 46° W.	4.9	S. 84° W.	5.3	S. 57° W.	4.7	S. 20° W.	4.0	S. 78° W.	1.6	S. 47° W.	3.4	S. 26° W.	3.6	S. 65° W.	5.7	S. 40° W.	5.2	S. 55° W.	4.8	N. 68° W.	2.6
2,500	S. 52° W.	6.6	S. 60° W.	5.4	N. 85° W.	7.1	S. 65° W.	5.2	S. 43° W.	4.6	S. 85° W.	2.1	S. 34° W.	4.0	S. 33° W.	5.1	S. 83° W.	8.2	S. 55° W.	5.5	S. 44° W.	4.2	N. 66° W.	3.3
3,000	S. 58° W.	7.7	S. 74° W.	5.6	N. 89° W.	10.7	S. 72° W.	7.3	S. 56° W.	1.9	N. 33° W.	2.5	S. 23° W.	5.3	S. 42° W.	6.9	S. 67° W.	8.4	S. 59° W.	6.5	S. 29° W.	1.0	N. 56° W.	3.5
3,500	N. 77° W.	8.8	N. 81° W.	8.2	S. 88° W.	13.0	S. 78° W.	8.0	W.	7.1	N. 57° W.	6.0	S. 17° W.	5.1	S. 50° W.	6.3	S. 64° W.	9.8	S. 63° W.	8.8	N. 17° W.	1.0	N. 46° W.	4.9
4,000	N. 47° W.	7.8	N. 55° W.	11.5	N. 82° W.	16.8	N. 88° W.	8.7	N. 79° W.	14.0	N. 48° W.	7.8	S. 20° W.	6.1	S. 77° W.	6.6	S. 80° W.	13.6	N. 88° W.	12.4	N. 14° W.	3.3	N. 73° W.	6.7
4,500	.....	.....	.....	.....	N. 73° W.	19.0	S. 68° W.	10.0	.....	.....	.....	.....	S. 22° W.	5.9	N. 2° E.	1.1	N. 88° W.	17.3	.....	.....	N. 14° W.	3.3	.....	.....
5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	S. 14° W.	5.6	N. 53° W.	8.4	S. 86° W.	17.4	.....	.....	S. 66° W.	1.2	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

PRESSURE AND WINDS.

The atmospheric circulation during May assumed to a considerable extent the flattened system of isobars common to the summer season, and there was a very general slacking up of the cyclonic and anticyclonic activity that had been a rather marked feature of the weather during several months preceding.

The anticyclones had their origin mostly over the southwestern districts and drifted northeastward or eastward, usually without definite centers of action. However, near the end of the first decade low pressure developed over the middle Rocky Mountain region, and pressure remained low in that vicinity for several days, finally developing into a storm, which by the morning of the 11th had assumed definite form, central over western South Dakota. More or less precipitation occurred in the western mountain and adjacent districts during the formation of this low area, and general rains accompanied its northward movement over the Dakotas into the Canadian districts during the following few days. The falls were particularly heavy in the Black Hills region and locally elsewhere in the Dakotas and portions of adjoining States. During the early formative period of this storm heavy snows fell in southwestern Colorado and adjacent portions of Utah and Arizona, the fall in southwestern Utah being the heaviest ever recorded in May. Light snow extended over considerable areas, particularly to the westward, reaching Roseburg, Oreg., where it was observed in May for the first time in nearly 50 years.

During much of the first and second decades pressure remained comparatively low over southern districts, and local rains, heavy in many localities, persisted for considerable periods, particularly in the Gulf and South Atlantic States and over portions of the Ohio and middle Mississippi Valleys. By the morning of the 18th low pressure had concentrated into a trough formation extending from the upper Mississippi Valley southeastward to the Carolinas, and during the following 24 hours assumed a definite cyclonic formation central over the lower Lakes. This was attended by general precipitation from the Mississippi eastward, the falls becoming heavy locally near the storm center. This storm quickly lost force, however, and passed down the St. Lawrence Valley without material precipitation.

During the last decade of the month shallow cyclones moved in irregular courses over the central valleys and southern districts, and precipitation was frequent and locally heavy over much of the country from the middle and southern Great Plains eastward.

Anticyclones moving southward from the Hudson Bay region dominated the northeastern districts during much of the month, while in the far Northwest offshoots from the permanent high area over the North Pacific reached the coast on a number of dates, but usually did not materially influence weather conditions to eastward of the Rocky Mountains. In the region between the Great Lakes and Rocky Mountains and thence southward there was a notable absence of anticyclones, particularly of those frequently moving southward from the Alberta district.

For the month, as a whole, pressure was highest and materially above normal over the far Northwest, with a secondary high area over the Northeastern States, where the average pressure was likewise appreciably above normal. Over the central valleys and southern districts the average pressure was comparatively low and generally somewhat less than normal.

Compared with the preceding month the pressure was less in all districts save the extreme Northeast, the falling off being quite large over the southeastern States and along the California coast.

Winds over the districts from the Mississippi Valley eastward did not reach high velocities, as a rule, save in connection with local thunderstorms, which were widely scattered both as to location and time. On the other hand, over the Great Plains and thence westward high winds were confined mainly to definite localities and dates. Over the middle and northern Great Plains and the adjacent eastern foothills of the Rocky Mountains high winds prevailed over large areas in connection with the well-developed cyclone that moved northward over those districts on the 10th and 11th. Also in the Plateau region high winds prevailed over extensive areas on the 25th. A more complete statement of the severe storms of the month appears at the end of this section. The prevailing direction of the winds is graphically shown on Chart VI.

TEMPERATURE.

In the absence of important changes in atmospheric pressure, daily temperature variations were likewise small, 24-hour changes of 20° or more occurring in only a

few instances, mostly in the western mountain districts. From the Rocky Mountains eastward the month, as a whole, was warmer than normal, and distinctly so over the central and northern districts; in the region of the Great Lakes the average excess ranged from 6° to 9° per day, and the month was among the warmest of record. Only a few days had temperatures below normal.

In the Rocky Mountain and Plateau regions there was usually a slight deficiency in the monthly means, but over the Pacific coast States from Oregon southward the month was slightly warmer than normal. In many portions of the far West May is the first month of the present year having temperatures above normal.

The important warm periods of the month were near the end of the first and the beginning of the second decade over the central valleys and Gulf States, and generally during the last decade in the regions from the Great Plains westward and over portions of the Northeast. Maximum temperatures were above 90° at some time during the month in all the States, and they were above 100° at points in Texas, Arizona, Colorado, and Nevada—the highest, 111°, occurring in California.

Cool periods were mainly on the first day of the month from Missouri, Arkansas, and Louisiana eastward and northeastward to the Atlantic coast, and from the 9th to the 12th from the Great Plains westward. During this period minimum temperatures in portions of the Plateau and Pacific coast States were as low as, and in a few cases lower than, ever before observed in May.

PRECIPITATION.

Rain was generally abundant, and in many sections far above normal, from Texas and Oklahoma eastward. The falls were particularly heavy in the Middle and East Gulf States, where the average excesses by States ranged from 2 to nearly 4 inches. In the Ohio and middle Mississippi Valleys precipitation was of frequent occurrence and at times heavy, but the monthly amounts were usually slightly less than normal, particularly in portions of Iowa and Missouri. Over most other districts precipitation was slightly less than normal, although marked deficiencies were not evident over extensive areas. In a few southern localities the precipitation was the greatest of record for May, notably at Charleston, S. C. The severe drought over portions of southern Florida that had existed for an unusual period was effectively broken.

SNOWFALL.

The areas having snowfall during May, 1922, were confined to the more elevated mountain regions of the West. Some heavy falls occurred near the end of the first decade from northern Arizona and southwestern Colorado and southern Utah northward to Wyoming and the Black Hills region of South Dakota. In some localities the snow during this period was the heaviest ever observed in May. In the high mountains of California and thence northward to Washington there were local heavy falls, in a few cases amounting to 3 feet or more. In other mountain districts snow was more or less general, but the amounts were usually small.

The continued cool weather in the far western districts up to May prevented rapid early melting to that time, so that stored amounts in the high mountains are now greater in many localities than usual at this period of the year. The warmer weather of May accelerated melting, and the streams fed from the melting snow were usually well filled.

RELATIVE HUMIDITY.

The excessive rainfall in the Gulf and South Atlantic States was reflected in the average relative humidity of that section, which ranged up to 15 per cent or more above the normal for the month. Rather humid conditions likewise prevailed over the Great Plains region, where there were frequent rains, although the average precipitation was usually slightly less than the normal.

In the districts from the Rocky Mountains westward the relative humidity was almost universally less than normal, and there was likewise a general deficiency in the monthly precipitation. From the Great Lakes eastward to the Atlantic coast the average relative humidity was generally less than normal, and there was likewise a very general deficiency in the precipitation over the same region.

Some unusually low relative humidity values were noted at the local noon observations on several distinct dates, notably from the 8th to 10th over the Atlantic coast districts, where, under the influence of anticyclonic conditions, humidity readings under 20 per cent were observed at a number of points. Likewise in the middle Mississippi Valley, and extending eastward to Lake Michigan and Indiana, on the 13th low-humidity readings were observed. At Chicago, Ill., 22 per cent was observed at the noon observation, and later in the afternoon a value of 17 per cent was observed, probably the lowest ever recorded in the history of the station. Values only slightly above 20 per cent were observed at a number of other points in the district. The pressure was not high at the time, but north to northwest winds prevailed and a cyclone of small proportions was moving into the region from the Dakotas.